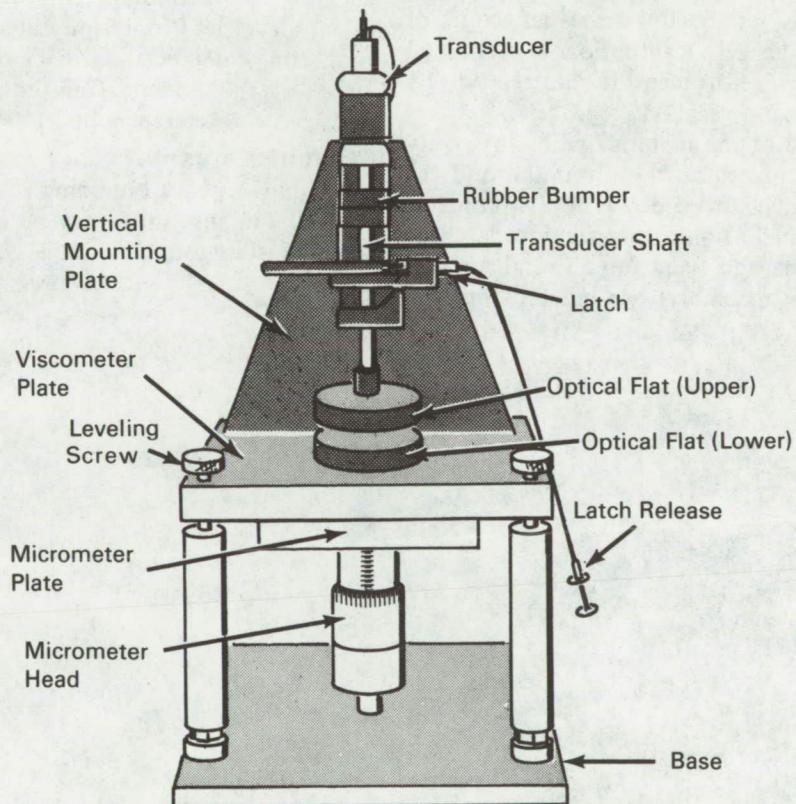


NASA TECH BRIEF



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Absolute Viscosity Measured Using Instrumented Parallel Plate System



The problem:

To measure absolute viscosity of liquids or slurries and automatically display the results on a graphic record. Prior methods have involved time consuming apparatus setup and have required extensive calculations from initial measurements.

The solution:

An automatic system that measures the true average shear viscosity of liquids and viscoelastic materials,

based on the parallel plate method. The system consists of a viscometer sensor, a computer, a time base, and a strip chart recorder.

How it's done:

The viscometer consists of a base, vertical and horizontal mounting plates, and the necessary related hardware to mount two optical flats, mated to two color fringes, that are used in lieu of parallel plates. The mounting devices incorporate leveling and deflection screws that afford parallelism between the two

(continued overleaf)

optical flats through 360° rotation. The lower optical flat is mounted above the micrometer head, resting normally on a machined recess in the lower frame and the upper flat is fixed to the end of a shaft that extends upward through two linear bearings to a linear displacement transducer. The shaft is equipped with a simple friction latch that permits it to be retained in any desired position. A collar and rubber bumper prevent the optical flats from damage by severe contact.

With the upper and lower flats mated (two-color fringes), the micrometer head is turned until movement of the strip chart recorder pen is noted, and the micrometer is backed off until the pen no longer moves(zero calibration point). The range (thousandths of an inch the specimen under test is expected to vary in thickness) is set for full scale deflection of the recorder pen. The zero calibration is rechecked and the system is now set to measure and record any movement of the upper optical flat.

A discrete volume of the material whose viscosity is to be measured is placed on the lower flat and the upper flat is manually moved down until it contacts the material, at which point the friction latch is fastened. The volume and fixed force (weight of the upper flat and shaft assembly) are entered into the

computer as is the initial height of the upper flat just in contact with the material. The instantaneous measurement of the materials' viscosity is computed upon releasing the friction latch which starts the recorder time base. Points are plotted automatically for tests of preselected duration and an extrapolation to one second is made.

Notes:

1. This system could be applied to general measurement of viscosity of liquids and viscoelastic materials. The paint and petroleum industries are examples. Pathology laboratories might also find it useful.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California 91103
Reference: B67-10041

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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